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Northeast Corridor Regional Modeling Project Determination of Organic Species Profiles for Gasoline Liquids and Vapors

Midwest Research Inst.
Kansas City, MO

Prepared for

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16. ABSTRACT

Midwest Research Institute collected gasoline samples from five northeast cities in July 1980 and delivered the samples to the Department of Energy, Bartlesville, OK where gas chromatography analysis was performed to determine both liquid and vapor species profiles for each sample.

The purposes of this study were (1) to determine organic species profiles for gasoline vapors for use in photochemical modeling applications, (2) to compare organic species profiles for gasoline vapors to organic species profiles of gasoline liquids, and (3) to determine the effect of temperature on gasoline vapor speciation.

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Northeast Corridor Regional Modeling Project - Determination Of Organic Species Profiles For Gasoline Liquids And Vapors

by

Midwest Research Institute
425 Volker Boulevard
Kansas City, Missouri 64110

Contract No. 68-02-2524

EPA Project Officer: Tom Braverman

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air, Noise, and Radiation
Office of Air Quality Planning and Standards
Research Triangle Park, North Carolina 27711

December 1980

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SECTION 1

INTRODUCTION

The Office of Air Quality Planning and Standards (OAQPS) is undertaking a large program to validate and demonstrate photochemical oxidant diffusion models. The program will include the application of a Regional model to the Northeast Corridor of the United States, and the application of the SAI Urban Airshed Model to five metropolitan areas (Boston, New York, Philadelphia, Baltimore, and Washington, DC) in the northeastern United States, respectively. This report presents the results of a study to determine organic species profiles for gasoline liquids and vapors for 20 samples of gasoline(s) collected from the five metropolitan areas. The purposes of this study were (1) to determine organic species profiles for gasoline vapors for use in photochemical modeling applications, (2) to compare organic species profiles for gasoline vapors to organic species profiles of gasoline liquids, and (3) to determine the effect of temperature on gasoline vapor speciation.

The sampling was conducted by Midwest Research Institute (MRI) personnel during the period July 14 to July 18, 1980. The sample analysis was conducted by Department of Energy (DOE), Bartlesville, Oklahoma. For each of the 20 samples, both the liquid organic species profile and the vapor organic species profile at an equilibrium temperature of 80°F (27°C) were determined by gas chromatography (GC) analysis. The Exxon regular leaded and Exxon regular unleaded Philadelphia samples were also analyzed for vapor organic species at an equilibrium temperature of 60°F (16°C), 100°F (38°C), and 120°F (49°C).

SECTION 2

SAMPLING PROCEDURES

One-quart metal containers with inner seals to protect against leakage were selected to contain and store the samples. A brass nozzle adaptor was made to allow the leaded gasoline samples to be filled directly into the cans.

Due to fire regulations the sample cans were painted red and stenciled "GASOLINE" on their exteriors. Adhesive labels were affixed showing address, date, type of gasoline, and signature of the sampler. The sampling techniques were tested in the Kansas City area prior to sample gathering. Whereever possible the fire marshall or other responsible person in each locality was contacted prior to beginning the sampling trip to ensure that local regulations and the sampling program were not in conflict.

Each sample container was filled with the specified grade of gasoline at a filling station within the city limits as shown in Table 1. The containers were filled to 90% of capacity and inner seals installed. The delivery hose was flushed with a minimum of 1 gal. of gasoline prior to sample collection. After collection the samples were stored in a metal insulated chest until delivered for analysis. Dry ice was added to the insulated chest as needed to prvent excessive temperatures.

No sampling problems were encountered. Sample cans proved to keep the samples from leaking. Samples were transported by car to DOE, Bartlesville, Oklahoma. The samples were kept in cold (0°F) storage at DOE prior to analysis.

TABLE 1. SAMPLING MATRIX

City	Brand of gasoline		
	Leaded regular	Unleaded regular	Unleaded premium
Boston	(2) Mobil (3) Texaco	(4) Mobil (5) Texaco	(6) Shell
New York	(7) Mobil	(8) Mobil	(9) Mobil
Philadelphia	(10) Arco (11) Exxon[a/]	(12) Arco (13) Exxon[a/] (14) Sunoco	(15) Amoco
Baltimore	(16) Exxon	(17) Exxon	(18) Shell
Washington, D.C.	(19) Amoco	(20) Amoco	(21) Amoco

Note: Numbers in parentheses indicate the corresponding summary table.

[a/] Vapor analysis performed at four temperatures.

SECTION 3

ANALYSIS PROCEDURES

The analysis procedures were established by Dr. Frank Cox of DOE. The samples were analyzed on a Perkin-Elmer Gas Chromatograph, Model 900 with flame ionization detector. The column used was a 200 ft squalane (0.01 mm I.D. stainless steel) with helium carrier and nitrogen make-up gases. The chromatograph was calibrated daily with a blend of propane, isobutane, isobutene, and n-butane. The data were collected with a Hewlett Packard 3353-A Laboratory Automation System and monitored with a strip recorder. The collected data were then processed by a Hewlett Packard 2100 computer system.

The bulk liquids were analyzed by direct syringe injection of a chilled (0°F) sample into the GC column. A more complex method, described below, was needed to determine organic species profiles for gasoline vapors.

A 250 cc glass, round-bottom flask fitted with side arm (for evacuating) and top with rubber septum (total volume = 333 cc) was rinsed with a 50:50 mixture of acetone/petroleum ether, flushed with nitrogen and evacuated to hard vacuum (halocarbon grease used for ground glass joints). A syringe loaded with 22 cc's of liquid sample was injected through the rubber septum creating a 1:15 liquid to vapor ratio. The flask was encased in a heating mantle or placed in a controlled temperature environment, brought to desired temperature, and allowed to equilibrate for 2 hr. Using a hypodermic needle, air was introduced into the flask through the rubber septum, reducing the vacuum to about 6 cm. The flask was then allowed to equilibrate at the desired temperature for 1 hr. The flask was then brought to atmospheric pressure with a hypodermic needle passed through the rubber septum. A 4 cc vapor sample was drawn from the flask and injected into a 32 liter Tedlar bag simultaneously with 8 liters of air. A 25 cc vapor sample from the Tedlar bag was injected onto the column and held for 5 min at -130°C. The oven temperature was then raised to -10°C and was programmed to rise at 2.5°C/minute until 100°C was reached. The oven temperature was held for 30 min at 100°C.

SECTION 4

RESULTS

The analysis printouts (see the Appendix)[a] were used by MRI to produce tables of volume and weight percent of hydrocarbons by carbon number and by chemical class. These results appear in Tables 2 through 21. No acetylenes were detected and only one sample (Table 10) showed an apparent oxygenated compound.

Tables 2 through 21 were derived from the analysis printouts by use of the equations shown below:

liquid vol % = vol fraction x 100
liquid wt % = mole fraction x 100 x molecular wt - results normalized to 100
vapor vol % = mole fraction x 100
vapor wt % = mole fraction x 100 x molecular wt - results normalized to 100

The molecular weights used are shown in Table 22. The oxygenates were assumed to be alcohols. Since the only oxygenate found is believed to be acetaldehyde, the C_2 molecular weight for oxygenates was changed to that for acetaldehyde.

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a Sampling and Analysis Data Sheets, the appendix to this report, is available as a separate publication (EPA-450/4-80-036b).

SECTION 5

CONCLUSIONS

The results indicate that organic species profiles of gasoline vapors differ significantly from organic species profiles of gasoline liquids. The range into which the 20 gasoline liquid and vapor species profiles fall is given below.

Reactivity Class	Liquid (wt. %)	Vapor (wt. %)
Aromatic	28-52	0.8-3.2
Olefin	0-12	0-22
Paraffin	37-67	76-98

The vapor profiles show only a small percentage of aromatics due to the low volatility of aromatics. Conversely, the vapor profiles show a high percentage of paraffins due to the high volatility of C_4 and C_5 paraffins. There is also an increase in the percentage of olefins in the vapor profiles due to the high volatility of C_4 and C_5 olefins.

The two samples measured at varying vapor temperatures (Tables 11a and 13a) show only minor changes in composition with temperature, but the total hydrocarbon concentration increases substantially with temperature.

TABLE 2. BOSTON, MASSACHUSETTS, MOBIL LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.14	0.00	0.00	0.14
4	7.08	1.05	0.00	8.13
5	15.63	2.57	0.00	18.20
6	17.43	1.74	1.24	20.41
7	10.24	0.73	4.42	15.39
8	10.78	0.04	6.22	17.04
9	4.47	0.12	6.67	11.26
10	2.16	0.00	5.41	7.57
11	0.55	0.00	0.66	1.21
12	0.58	0.00	0.08	0.66
TOTAL	69.06	6.25	24.70	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	46.96	4.03	0.00	50.99
5	32.95	3.55	0.00	36.50
6	9.93	0.31	0.25	10.49
7	1.38	0.00	0.38	1.76
8	0.23	0.00	0.03	0.26
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.45	7.89	0.66	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.10	0.00	0.00	0.10
4	5.66	0.88	0.00	6.55
5	13.61	2.35	0.00	15.96
6	16.23	1.70	1.51	19.44
7	10.13	0.72	5.31	16.16
8	10.68	0.04	7.47	18.18
9	4.46	0.11	8.02	12.59
10	2.21	0.00	6.78	8.99
11	0.56	0.00	0.78	1.34
12	0.61	0.00	0.09	0.69
TOTAL	64.25	5.80	29.95	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	40.82	3.38	0.00	44.20
5	35.56	3.72	0.00	39.28
6	12.80	0.39	0.29	13.48
7	2.07	0.00	0.52	2.59
8	0.39	0.00	0.05	0.44
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.64	7.50	0.86	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,470 ppm C total)

TABLE 3. BOSTON, MASSACHUSETTS, TEXACO LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.08	0.00	0.00	0.08
4	4.02	1.13	0.00	5.15
5	17.73	2.34	0.00	20.07
6	21.00	0.99	0.98	22.97
7	12.13	0.76	3.33	16.22
8	9.64	0.03	7.99	17.66
9	4.77	0.07	7.10	11.94
10	1.75	0.00	3.39	5.14
11	0.43	0.00	0.36	0.79
12	0.00	0.00	0.00	0.00
TOTAL	71.55	5.32	23.15	100.02

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	33.37	5.49	0.00	38.86
5	41.25	3.43	0.00	44.68
6	13.22	0.32	0.27	13.81
7	1.92	0.00	0.40	2.32
8	0.25	0.00	0.10	0.35
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.01	9.24	0.77	100.02

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.05	0.00	0.00	0.05
4	3.22	0.96	0.00	4.17
5	15.51	2.16	0.00	17.66
6	19.54	0.99	1.20	21.72
7	12.10	0.74	4.02	16.86
8	9.55	0.04	9.65	19.23
9	4.79	0.07	8.57	13.43
10	1.80	0.00	4.20	6.00
11	0.44	0.00	0.43	0.87
12	0.00	0.00	0.00	0.00
TOTAL	66.99	4.95	28.06	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	28.03	4.45	0.00	32.48
5	43.01	3.48	0.00	46.48
6	16.46	0.39	0.30	17.16
7	2.78	0.00	0.53	3.31
8	0.41	0.00	0.15	0.57
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.69	8.32	0.99	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,380 ppm C total)

TABLE 4. BOSTON, MASSACHUSETTS, MOBIL UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.23	0.00	0.00	0.23
4	6.53	1.23	0.00	7.76
5	14.65	3.32	0.00	17.97
6	11.56	2.32	1.38	15.26
7	8.66	1.18	6.00	15.84
8	10.03	0.04	10.32	20.39
9	4.02	0.10	10.58	14.70
10	1.49	0.00	5.33	6.82
11	0.28	0.00	0.40	0.68
12	0.37	0.00	0.00	0.37
TOTAL	57.82	8.19	34.01	100.02

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	2.95	0.00	0.00	2.95
4	45.71	4.57	0.00	50.28
5	33.14	4.90	0.00	38.04
6	6.09	0.51	0.33	6.93
7	1.17	0.00	0.47	1.64
8	0.15	0.00	0.00	0.15
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.21	9.98	0.80	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.15	0.00	0.00	0.15
4	5.12	1.02	0.00	6.14
5	12.41	2.97	0.00	15.38
6	10.55	2.21	1.65	14.41
7	8.44	1.13	7.04	16.61
8	9.72	0.04	12.12	21.87
9	3.92	0.09	12.45	16.46
10	1.49	0.00	6.36	7.85
11	0.28	0.00	0.46	0.74
12	0.38	0.00	0.00	0.38
TOTAL	52.47	7.46	40.08	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	1.99	0.00	0.00	1.99
4	40.56	3.92	0.00	44.48
5	36.51	5.25	0.00	41.76
6	8.01	0.66	0.39	9.06
7	1.79	0.00	0.66	2.45
8	0.26	0.00	0.00	0.26
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.13	9.82	1.06	100.00

BULK LIQUID

SATURATED VAPOR @80 DEGREES F.
(1,440 ppm C total)

TABLE 5. BOSTON, MASSACHUSETTS, TEXACO UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.06	0.00	0.00	0.06
4	6.72	1.24	0.00	7.96
5	12.89	3.63	0.00	16.52
6	9.93	2.33	0.00	12.26
7	11.35	1.34	4.86	17.55
8	16.75	0.04	7.55	24.34
9	4.61	0.19	7.79	12.59
10	2.08	0.00	5.01	7.09
11	0.32	0.00	0.54	0.86
12	0.77	0.00	0.00	0.77
TOTAL	65.48	8.77	25.75	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	5.36	1.04	0.00	6.40
5	11.14	3.31	0.00	14.45
6	9.21	2.27	0.00	11.48
7	10.83	1.30	5.82	17.94
8	16.49	0.04	9.04	25.57
9	4.58	0.19	9.35	14.12
10	2.13	0.00	6.13	8.27
11	0.33	0.00	0.64	0.96
12	0.79	0.00	0.00	0.79
TOTAL	60.90	8.13	30.97	100.00

BULK LIQUID

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	48.71	4.92	0.00	53.63
5	30.96	4.74	0.00	35.70
6	6.21	0.66	0.22	7.09
7	1.87	0.03	0.53	2.43
8	1.03	0.00	0.11	1.14
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	88.78	10.35	0.86	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	42.57	4.15	0.00	46.73
5	33.59	5.00	0.00	38.59
6	8.05	0.84	0.26	9.14
7	2.82	0.04	0.73	3.60
8	1.77	0.00	0.18	1.95
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	88.80	10.03	1.17	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,470 ppm C total)

TABLE 6. BOSTON, MASSACHUSETTS, SHELL UNLEADED PREMIUM

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	5.00	2.01	0.00	7.01
5	9.72	4.92	0.00	14.64
6	7.96	4.24	0.00	12.20
7	7.35	0.57	15.18	23.10
8	16.52	0.02	8.57	25.11
9	4.02	0.00	7.10	11.12
10	1.79	0.00	4.44	6.23
11	0.14	0.00	0.38	0.52
12	0.00	0.00	0.00	0.00
TOTAL	52.57	11.76	35.67	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	38.50	14.41	0.00	52.91
5	29.89	5.48	0.00	35.37
6	4.89	2.75	0.18	7.82
7	1.12	0.00	1.68	2.80
8	0.99	0.00	0.11	1.10
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	75.39	22.64	1.97	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.05	0.00	0.00	0.05
4	3.85	1.64	0.00	5.49
5	8.21	4.45	0.00	12.66
6	7.20	3.87	0.00	11.07
7	6.86	0.54	17.68	25.08
8	15.76	0.02	9.99	25.78
9	3.90	0.00	8.32	12.23
10	1.77	0.00	5.28	7.05
11	0.15	0.00	0.44	0.59
12	0.00	0.00	0.00	0.00
TOTAL	47.77	10.52	41.71	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	33.67	12.17	0.00	45.84
5	32.45	5.78	0.00	38.23
6	6.34	3.48	0.21	10.04
7	1.69	0.00	2.33	4.02
8	1.70	0.00	0.18	1.88
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	75.85	21.43	2.72	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,020 ppm C total)

TABLE 7. NEW YORK, NEW YORK, MOBIL LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.12	0.00	0.00	0.12
4	6.14	1.02	0.00	7.16
5	9.38	8.33	0.00	17.71
6	16.35	1.81	1.38	19.54
7	10.42	1.48	4.78	16.68
8	11.73	0.04	6.86	18.63
9	5.20	0.10	6.73	12.03
10	2.29	0.00	4.04	6.33
11	0.31	0.00	1.05	1.36
12	0.38	0.00	0.08	0.46
TOTAL	62.32	12.78	24.92	100.02

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	45.06	4.11	0.00	49.17
5	34.76	3.74	0.00	38.50
6	9.41	0.20	0.41	10.02
7	1.58	0.00	0.47	2.05
8	0.27	0.00	0.00	0.27
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.08	8.05	0.88	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.09	0.00	0.00	0.09
4	4.87	0.85	0.00	5.72
5	8.14	7.49	0.00	15.62
6	15.22	1.77	1.67	18.66
7	10.25	1.43	5.70	17.38
8	11.55	0.04	8.19	19.77
9	5.18	0.09	[illegible]	13.32
10	2.33	0.00	5.05	7.39
11	0.32	0.00	1.26	1.57
12	0.38	0.00	0.10	0.49
TOTAL	58.32	11.67	30.01	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	39.02	3.44	0.00	42.45
5	37.36	3.91	0.00	41.27
6	12.08	0.25	0.48	12.81
7	2.36	0.00	0.65	3.00
8	0.46	0.00	0.00	0.46
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.28	7.60	1.12	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,260 ppm C total)

TABLE 8. NEW YORK, NEW YORK, MOBIL UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.12	0.00	0.00	0.12
4	6.07	1.41	0.00	7.48
5	13.52	3.06	0.00	16.58
6	10.72	2.29	0.81	13.82
7	10.07	1.24	6.67	17.98
8	12.84	0.04	10.45	23.33
9	4.00	0.15	9.26	13.41
10	1.60	0.00	4.82	6.42
11	0.26	0.00	0.44	0.70
12	0.07	0.00	0.10	0.17
TOTAL	59.27	8.19	32.55	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.08	0.00	0.00	0.08
4	4.76	1.17	0.00	5.93
5	11.50	2.73	0.00	14.24
6	9.80	2.20	0.97	12.97
7	9.52	1.18	7.85	18.55
8	12.48	0.04	12.31	24.83
9	3.90	0.15	10.93	14.98
10	1.61	0.00	5.85	7.45
11	0.26	0.00	0.52	0.78
12	0.07	0.00	0.12	0.19
TOTAL	53.99	7.46	38.55	100.00

BULK LIQUID

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	1.40	0.00	0.00	1.40
4	45.44	5.98	0.00	51.42
5	32.23	4.98	0.00	37.21
6	6.46	0.53	0.35	7.34
7	1.46	0.03	0.61	2.10
8	0.49	0.00	0.04	0.53
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	87.48	11.52	1.00	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.93	0.00	0.00	0.93
4	39.97	5.08	0.00	45.05
5	35.19	5.29	0.00	40.48
6	8.43	0.68	0.41	9.51
7	2.21	0.04	0.85	3.11
8	0.85	0.00	0.06	0.91
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	87.59	11.09	1.33	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,410 ppm C total)

TABLE 9. NEW YORK, NEW YORK, MOBIL UNLEADED PREMIUM

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.09	0.00	0.00	0.09
4	3.04	0.44	0.00	3.48
5	28.35	0.87	0.00	29.22
6	5.99	0.69	1.15	7.83
7	4.43	0.24	13.69	18.36
8	8.25	0.01	8.72	16.98
9	9.85	0.07	9.51	19.43
10	0.56	0.00	3.58	4.14
11	0.03	0.00	0.15	0.18
12	0.27	0.00	0.00	0.27
TOTAL	60.86	2.32	36.80	99.98

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	22.40	1.47	0.00	23.87
5	69.24	1.07	0.00	70.31
6	3.48	0.00	0.29	3.77
7	0.42	0.00	1.20	1.62
8	0.32	0.00	0.12	0.44
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	95.86	2.54	1.61	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	2.38	0.37	0.00	2.74
5	23.87	0.78	0.00	24.65
6	5.43	0.66	1.37	7.45
7	4.28	0.23	16.06	20.57
8	7.95	0.01	10.28	18.24
9	9.72	0.07	11.17	20.95
10	0.56	0.00	4.26	4.83
11	0.03	0.00	0.18	0.21
12	0.27	0.00	0.00	0.27
TOTAL	54.56	2.12	43.32	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	18.65	1.18	0.00	19.83
5	71.57	1.08	0.00	72.65
6	4.30	0.00	0.32	4.62
7	0.60	0.00	1.59	2.19
8	0.52	0.00	0.18	0.71
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	95.65	2.26	2.09	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,540 ppm C total)

TABLE 10. PHILADELPHIA, PENNSYLVANIA, ARCO LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.92 [A]
3	0.08	0.00	0.00	0.08
4	7.85	0.02	0.00	7.87
5	17.87	0.03	0.00	17.90
6	19.69	0.02	2.17	21.88
7	12.94	0.05	6.46	19.45
8	8.52	0.00	7.03	15.55
9	3.76	0.03	5.91	9.70
10	1.90	0.00	4.03	5.93
11	0.32	0.00	0.23	0.55
12	0.11	0.00	0.06	0.17
[A] TOTAL	73.04	0.15	25.89	100.00

[A] OXYGENATE COMPOUND WITH A CARBON #= 2 FOUND @ 0.92 %

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	50.90	0.00	0.00	50.90
5	35.89	0.00	0.00	35.89
6	9.78	0.00	0.90	10.68
7	1.67	0.00	0.66	2.33
8	0.14	0.00	0.06	0.20
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	98.38	0.00	1.62	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	1.00 [A]
3	0.05	0.00	0.00	0.05
4	6.28	0.01	0.00	6.29
5	15.61	0.02	0.00	15.63
6	18.51	0.02	2.65	21.18
7	12.50	0.05	7.78	20.33
8	8.39	0.00	8.47	16.85
9	3.77	0.03	7.13	10.93
10	1.95	0.00	4.99	6.94
11	0.33	0.00	0.28	0.61
12	0.11	0.00	0.07	0.18
[A] TOTAL	67.50	0.14	31.36	100.00

[A] OXYGENATE COMPOUND WITH A CARBON #= 2 FOUND @ 1.00 %

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	44.08	0.00	0.00	44.08
5	38.58	0.00	0.00	38.58
6	12.56	0.00	1.05	13.61
7	2.49	0.00	0.91	3.40
8	0.24	0.00	0.09	0.33
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	97.95	0.00	2.05	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(3,700 ppm C total)

TABLE 11. PHILADELPHIA, PENNSYLVANIA, EXXON LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.14	0.00	0.00	0.14
4	5.94	1.06	0.00	7.00
5	17.21	3.13	0.00	20.34
6	17.36	2.91	1.08	21.35
7	8.81	1.92	4.07	14.80
8	8.23	0.06	5.96	14.25
9	4.90	0.08	7.82	12.80
10	2.41	0.00	5.17	7.58
11	0.32	0.00	0.67	0.99
12	0.59	0.00	0.16	0.75
TOTAL	65.91	9.16	24.93	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.10	0.00	0.00	0.10
4	4.74	0.89	0.00	5.63
5	15.00	2.89	0.00	17.89
6	16.21	2.85	1.32	20.39
7	8.57	1.88	4.90	15.34
8	8.21	0.06	7.17	15.44
9	4.90	0.08	9.41	14.40
10	2.46	0.00	6.44	8.90
11	0.32	0.00	0.80	1.12
12	0.61	0.00	0.19	0.80
TOTAL	61.12	8.65	30.23	100.00

BULK LIQUID

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	41.02	4.32	0.00	45.34
5	38.80	3.18	0.00	41.98
6	10.38	0.64	0.39	11.41
7	0.59	0.30	0.32	1.21
8	0.06	0.00	0.00	0.06
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.85	8.44	0.71	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	35.31	3.59	0.00	38.90
5	41.46	3.30	0.00	44.76
6	13.25	0.80	0.45	14.50
7	0.88	0.44	0.44	1.75
8	0.10	0.00	0.00	0.10
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.98	8.13	0.89	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,320 ppm C total)

TABLE 11a. PHILADELPHIA, PENNSYLVANIA, EXXON LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.88	0.00	0.00	0.88
4	43.87	4.19	0.00	48.06
5	35.41	4.08	0.00	39.49
6	9.84	0.27	0.19	10.30
7	0.86	0.00	0.37	1.23
8	0.04	0.00	0.00	0.04
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.90	8.54	0.56	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.58	0.00	0.00	0.58
4	38.20	3.52	0.00	41.72
5	38.27	4.29	0.00	42.56
6	12.70	0.34	0.22	13.27
7	1.29	0.00	0.51	1.80
8	0.07	0.00	0.00	0.07
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.12	8.15	0.73	100.00

SATURATED VAPOR @ 60 DEGREES F.
(970 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	41.02	4.32	0.00	45.34
5	38.80	3.18	0.00	41.98
6	10.38	0.64	0.39	11.41
7	0.59	0.30	0.32	1.21
8	0.06	0.00	0.00	0.06
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.85	8.44	0.71	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	35.31	3.59	0.00	38.90
5	41.46	3.30	0.00	44.76
6	13.25	0.80	1.45	14.50
7	0.88	0.44	0.44	1.75
8	0.10	0.00	0.00	0.10
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.98	8.13	0.89	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,320 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	40.30	4.25	0.00	44.55
5	39.03	3.59	0.00	42.62
6	10.37	1.01	0.41	11.79
7	0.76	0.00	0.22	0.98
8	0.05	0.00	0.00	0.05
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.51	8.85	0.63	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	34.64	3.53	0.00	38.17
5	41.65	3.72	0.00	45.37
6	13.22	1.26	0.47	14.95
7	1.13	0.00	0.30	1.43
8	0.08	0.00	0.00	0.08
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.72	8.51	0.77	100.00

SATURATED VAPOR @ 100 DEGREES F.
(1,550 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	38.47	4.10	0.00	42.57
5	39.24	4.74	0.00	43.98
6	10.81	1.08	0.40	12.29
7	0.84	0.00	0.27	1.11
8	0.05	0.00	0.00	0.05
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.41	9.92	0.67	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	32.89	3.38	0.00	36.27
5	41.65	4.89	0.00	46.54
6	13.70	1.34	0.46	15.50
7	1.24	0.00	0.37	1.60
8	0.08	0.00	0.00	0.08
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.56	9.61	0.83	100.00

SATURATED VAPOR @ 120 DEGREES F.
(2,130 ppm C total)

TABLE 12. PHILADELPHIA, PENNSYLVANIA, ARCO UNLEADED REGULAR

BULK LIQUID

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	7.32	0.03	0.00	7.35
5	17.63	0.09	0.00	17.72
6	16.45	0.01	1.82	18.28
7	9.69	0.01	7.61	17.31
8	4.58	0.00	13.48	18.06
9	1.55	0.00	12.03	13.58
10	0.87	0.00	5.83	6.70
11	0.21	0.00	0.43	0.64
12	0.14	0.00	0.16	0.30
TOTAL	58.48	0.14	41.36	99.98

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.03	0.00	0.00	0.03
4	5.64	0.03	0.00	5.67
5	14.78	0.08	0.00	14.86
6	14.94	0.01	2.14	17.09
7	9.02	0.01	8.85	17.88
8	4.35	0.00	15.69	20.04
9	1.50	0.00	14.02	15.51
10	0.85	0.00	7.03	7.88
11	0.20	0.00	0.49	0.69
12	0.15	0.00	0.19	0.34
TOTAL	51.45	0.13	48.41	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,210 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	48.79	0.00	0.00	48.79
5	39.91	0.00	0.00	39.91
6	8.85	0.00	0.63	9.48
7	1.06	0.00	0.63	1.69
8	0.03	0.00	0.11	0.14
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	98.64	0.00	1.37	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	42.28	0.00	0.00	42.28
5	42.94	0.00	0.00	42.94
6	11.37	0.00	0.73	12.11
7	1.58	0.00	0.87	2.45
8	0.05	0.00	0.17	0.23
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	98.23	0.00	1.77	100.00

TABLE 13. PHILADELPHIA, PENNSYLVANIA, EXXON UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	4.38	0.87	0.00	5.25
5	12.94	8.79	0.00	21.73
6	9.53	2.40	1.52	13.45
7	5.60	1.05	8.81	15.46
8	13.55	0.05	6.61	20.21
9	3.66	0.06	12.13	15.85
10	1.40	0.00	5.97	7.37
11	0.18	0.00	0.36	0.54
12	0.00	0.00	0.10	0.10
TOTAL	51.28	13.22	35.50	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	34.47	3.96	0.00	38.43
5	49.25	2.81	0.00	52.06
6	6.39	0.47	0.66	7.52
7	0.60	0.00	0.74	1.34
8	0.65	0.00	0.00	0.65
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.36	7.24	1.40	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.03	0.00	0.00	0.03
4	3.41	0.71	0.00	4.13
5	10.91	7.75	0.00	18.66
6	8.65	2.29	1.80	12.75
7	5.29	1.00	10.30	16.59
8	12.96	0.05	7.73	20.73
9	3.55	0.05	14.22	17.82
10	1.39	0.00	7.18	8.56
11	0.18	0.00	0.42	0.61
12	0.00	0.00	0.12	0.12
TOTAL	46.38	11.86	41.76	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	29.37	3.26	0.00	32.63
5	52.10	2.89	0.00	54.99
6	8.07	0.58	0.76	9.41
7	0.88	0.00	1.00	1.88
8	1.09	0.00	0.00	1.09
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.52	6.73	1.76	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,240 ppm C total)

TABLE 13a. PHILADELPHIA, PENNSYLVANIA, EXXON UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	35.54	4.04	0.00	39.58
5	47.64	2.72	0.00	50.36
6	4.36	2.51	0.15	7.02
7	1.45	0.00	0.16	1.61
8	1.34	0.00	0.10	1.44
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.33	9.27	0.41	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	30.19	3.31	0.00	33.50
5	50.23	2.79	0.00	53.02
6	5.49	3.09	0.17	8.75
7	2.12	0.00	0.22	2.34
8	2.24	0.00	0.16	2.39
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	90.27	9.19	0.54	100.00

SATURATED VAPOR @ 60 DEGREES F.
(880 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	32.65	3.82	0.00	36.47
5	49.79	3.35	0.00	53.14
6	6.44	1.01	0.74	8.19
7	0.65	0.54	0.80	1.99
8	0.20	0.00	0.00	0.20
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.73	8.72	1.54	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	27.69	3.13	0.00	30.82
5	52.43	3.43	0.00	55.86
6	8.10	1.24	0.84	10.18
7	0.95	0.77	1.08	2.80
8	0.33	0.00	0.00	0.33
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.51	8.57	1.92	100.00

SATURATED VAPOR @ 100 DEGREES F.
(1,440 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	34.47	3.96	0.00	38.43
5	49.25	2.81	0.00	52.06
6	6.39	0.47	0.66	7.52
7	0.60	0.00	0.74	1.34
8	0.65	0.00	0.00	0.65
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.36	7.24	1.40	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	29.37	3.26	0.00	32.63
5	52.10	2.89	0.00	54.99
6	8.07	0.58	0.76	9.41
7	0.88	0.00	1.00	1.88
8	1.09	0.00	0.00	1.09
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.52	6.73	1.76	100.00

SATURATED VAPOR @ 80 DEGREES F.
(1,240 ppm C total)

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	31.02	3.56	0.00	34.58
5	51.26	3.90	0.00	55.16
6	6.53	1.04	0.58	8.15
7	0.74	0.51	0.70	1.95
8	0.17	0.00	0.00	0.17
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.72	9.01	1.28	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	26.21	2.90	0.00	29.12
5	53.77	3.98	0.00	57.74
6	8.18	1.27	0.66	10.11
7	1.08	0.73	0.94	2.74
8	0.28	0.00	0.00	0.28
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.52	8.88	1.60	100.00

SATURATED VAPOR @ 120 DEGREES F.
(1,990 ppm C total)

TABLE 14. PHILADELPHIA, PENNSYLVANIA, SUNOCO UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.12	0.00	0.00	0.12
4	6.72	0.69	0.00	7.41
5	11.78	2.28	0.00	14.06
6	8.72	2.51	0.34	11.57
7	7.91	0.74	4.66	13.31
8	20.77	0.02	8.52	29.31
9	5.03	0.14	8.71	13.88
10	2.15	0.00	5.89	8.04
11	0.82	0.00	0.76	1.58
12	0.52	0.00	0.18	0.70
TOTAL	64.54	6.38	29.06	99.98

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.08	0.00	0.00	0.08
4	5.29	0.57	0.00	5.86
5	10.05	2.05	0.00	12.10
6	8.00	2.37	0.41	10.78
7	7.51	0.71	5.51	13.73
8	20.09	0.02	10.07	30.19
9	4.94	0.14	10.31	15.39
10	2.16	0.00	7.22	9.39
11	0.83	0.00	0.89	1.72
12	0.54	0.00	0.22	0.75
TOTAL	59.48	5.88	34.64	100.00

BULK LIQUID

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	52.15	2.84	0.00	54.99
5	31.58	2.88	0.00	34.46
6	6.88	0.17	0.18	7.23
7	1.25	0.00	0.56	1.81
8	1.37	0.00	0.14	1.51
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	93.23	5.89	0.88	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	45.64	2.40	0.00	48.04
5	34.31	3.04	0.00	37.35
6	8.93	0.22	0.21	9.36
7	1.89	0.00	0.78	2.66
8	2.36	0.00	0.22	2.58
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	93.13	5.66	1.21	100.00

SATURATED VAPOR @ 80 DEGREES

(1,010 ppm C total)

TABLE 15. PHILADELPHIA, PENNSYLVANIA, AMOCO UNLEADED PREMIUM

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.06	0.00	0.00	0.06
4	4.66	1.43	0.00	6.09
5	11.47	5.92	0.00	17.39
6	7.47	3.69	0.97	12.13
7	4.64	1.47	16.90	23.01
8	9.96	0.03	9.95	19.94
9	2.91	0.02	10.69	13.62
10	1.01	0.00	6.08	7.09
11	0.22	0.00	0.30	0.52
12	0.08	0.00	0.06	0.14
TOTAL	42.48	12.56	44.95	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	39.28	6.59	0.00	45.87
5	35.43	6.17	0.00	41.60
6	5.72	2.91	0.28	8.91
7	0.73	0.04	2.00	2.77
8	0.75	0.00	0.10	0.85
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	81.91	15.71	2.38	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	3.54	1.14	0.00	4.68
5	9.44	5.14	0.00	14.58
6	6.66	3.42	1.12	11.20
7	4.33	1.36	19.29	24.97
8	9.30	0.02	11.35	20.68
9	2.75	0.01	12.23	14.99
10	0.98	0.00	7.17	8.15
11	0.22	0.00	0.35	0.56
12	0.07	0.00	0.07	0.14
TOTAL	37.33	11.10	51.58	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	33.77	5.47	0.00	39.25
5	37.82	6.40	0.00	44.22
6	7.29	3.62	0.32	11.24
7	1.08	0.06	2.73	3.87
8	1.27	0.00	0.16	1.42
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	81.24	15.56	3.21	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,040 ppm C total)

TABLE 16. BALTIMORE, MARYLAND, EXXON LEADED REGULAR

VOLUME PERCENT

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.09	0.00	0.00	0.09
4	4.92	1.18	0.00	6.10
5	17.48	3.21	0.00	20.69
6	16.42	2.91	1.12	20.45
7	9.41	1.56	4.37	15.34
8	8.28	0.07	5.94	14.29
9	4.55	0.07	9.58	14.20
10	1.89	0.00	5.59	7.48
11	0.28	0.00	0.51	0.79
12	0.51	0.00	0.06	0.57
TOTAL	63.83	9.00	27.17	100.00

VOLUME PERCENT

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	36.45	5.27	0.00	41.72
5	40.40	4.83	0.00	45.23
6	10.16	0.96	0.25	11.37
7	1.20	0.04	0.41	1.65
8	0.04	0.00	0.00	0.04
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	88.25	11.10	0.66	100.01

WEIGHT PERCENT

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	3.91	0.99	0.00	4.91
5	15.16	2.94	0.00	18.10
6	15.22	2.84	1.35	19.40
7	9.07	1.52	5.21	15.80
8	8.19	0.06	7.10	15.35
9	4.53	0.07	11.47	16.07
10	1.92	0.00	6.89	8.81
11	0.29	0.00	0.60	0.89
12	0.53	0.00	0.07	0.60
TOTAL	58.88	8.41	32.71	100.00

WEIGHT PERCENT

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	31.11	4.34	0.00	35.45
5	42.80	4.97	0.00	47.78
6	12.86	1.19	0.29	14.33
7	1.77	0.06	0.56	2.38
8	0.07	0.00	0.00	0.07
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	88.60	10.56	0.84	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,170 ppm C total)

TABLE 17. BALTIMORE, MARYLAND, EXXON UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	4.17	0.67	0.00	4.84
5	18.40	2.65	0.00	21.05
6	9.49	2.55	1.60	13.64
7	5.77	1.11	7.22	14.10
8	15.37	0.06	6.64	22.07
9	3.58	0.06	12.42	16.06
10	1.29	0.00	6.26	7.55
11	0.18	0.00	0.37	0.55
12	0.00	0.00	0.10	0.10
TOTAL	58.29	7.10	34.61	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	34.41	3.32	0.00	37.73
5	49.82	3.31	0.00	53.13
6	5.71	0.59	0.74	7.04
7	0.62	0.00	0.69	1.31
8	0.79	0.00	0.00	0.79
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.35	7.22	1.43	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.02	0.00	0.00	0.02
4	3.26	0.55	0.00	3.81
5	15.57	2.38	0.00	17.94
6	8.65	2.44	1.90	12.99
7	5.46	1.06	8.46	14.98
8	14.72	0.06	7.78	22.56
9	3.48	0.05	14.59	18.12
10	1.28	0.00	7.55	8.83
11	0.18	0.00	0.44	0.62
12	0.00	0.00	0.12	0.12
TOTAL	52.63	6.55	40.83	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	29.29	2.73	0.00	32.02
5	52.64	3.40	0.00	56.04
6	7.21	0.73	0.85	8.78
7	0.91	0.00	0.93	1.84
8	1.32	0.00	0.00	1.32
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.37	6.86	1.78	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,150 ppm C total)

TABLE 18. BALTIMORE, MARYLAND, SHELL UNLEADED PREMIUM

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	5.30	2.30	0.00	7.60
5	12.03	8.22	0.00	20.25
6	7.19	1.96	0.54	9.69
7	5.78	0.65	16.15	22.58
8	13.57	0.02	8.67	22.26
9	3.58	0.14	7.40	11.12
10	1.39	0.00	4.13	5.52
11	0.18	0.00	0.38	0.56
12	0.35	0.00	0.00	0.35
TOTAL	49.44	13.29	37.27	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	38.57	15.38	0.00	53.95
5	31.79	5.59	0.00	37.38
6	4.57	2.03	0.00	6.60
7	0.32	0.00	1.28	1.60
8	0.47	0.00	0.00	0.47
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	75.72	23.00	1.28	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	4.09	1.88	0.00	5.98
5	10.17	7.29	0.00	17.46
6	6.52	1.83	0.63	8.98
7	5.44	0.62	18.83	24.89
8	12.97	0.01	10.11	23.09
9	3.47	0.14	8.68	12.29
10	1.39	0.00	4.93	6.31
11	0.17	0.00	0.43	0.60
12	0.35	0.00	0.00	0.35
TOTAL	44.61	11.76	43.62	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	34.18	13.16	0.00	47.34
5	34.97	5.98	0.00	40.95
6	6.00	2.61	0.00	8.61
7	0.49	0.00	1.80	2.29
8	0.82	0.00	0.00	0.82
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	76.46	21.74	1.80	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,400 ppm C total)

TABLE 19. WASHINGTON, D.C., AMOCO LEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.11	0.00	0.00	0.11
4	6.58	0.96	0.00	7.54
5	14.72	2.79	0.00	17.51
6	16.46	1.96	1.44	19.86
7	11.33	0.86	5.08	17.27
8	10.99	0.04	6.74	17.77
9	4.44	0.11	6.93	11.48
10	2.17	0.00	4.77	6.94
11	0.37	0.00	0.57	0.94
12	0.42	0.00	0.15	0.57
TOTAL	67.59	6.72	25.68	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	46.29	3.79	0.00	50.08
5	33.03	3.84	0.00	36.87
6	9.72	0.41	0.37	10.50
7	1.74	0.00	0.51	2.25
8	0.27	0.00	0.03	0.30
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.05	8.04	0.91	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	5.24	0.81	0.00	6.05
5	12.76	2.55	0.00	15.31
6	15.37	1.91	1.74	19.03
7	11.17	0.83	6.06	18.07
8	10.78	0.04	8.05	18.86
9	4.40	0.11	8.30	12.81
10	2.21	0.00	5.92	8.14
11	0.39	0.00	0.67	1.05
12	0.44	0.00	0.17	0.61
TOTAL	62.83	6.25	30.92	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	40.08	3.17	0.00	43.25
5	35.50	4.01	0.00	39.52
6	12.48	0.51	0.43	13.42
7	2.60	0.00	0.70	3.30
8	0.46	0.00	0.05	0.51
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	91.13	7.70	1.18	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,370 ppm C total)

TABLE 20. WASHINGTON, D.C., AMOCO UNLEADED REGULAR

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.07	0.00	0.00	0.07
4	6.17	0.92	0.00	7.09
5	14.82	3.47	0.00	18.29
6	10.75	1.80	0.64	13.19
7	9.39	0.95	6.71	17.05
8	13.89	0.04	7.69	21.62
9	3.77	0.04	8.25	12.06
10	2.46	0.00	5.46	7.92
11	1.38	0.00	0.64	2.02
12	0.54	0.00	0.14	0.68
TOTAL	63.24	7.22	29.53	99.99

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	45.01	3.63	0.00	48.64
5	35.91	4.44	0.00	40.35
6	6.98	0.94	0.25	8.17
7	1.32	0.00	0.70	2.02
8	0.74	0.00	0.08	0.82
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.96	9.01	1.03	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.05	0.00	0.00	0.05
4	4.87	0.77	0.00	5.64
5	12.71	3.13	0.00	15.85
6	9.87	1.78	0.77	12.41
7	8.93	0.92	7.94	17.79
8	13.45	0.04	9.11	22.60
9	3.70	0.04	9.81	13.56
10	2.48	0.00	6.74	9.22
11	1.40	0.00	0.76	2.16
12	0.55	0.00	0.17	0.73
TOTAL	58.02	6.67	35.31	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	38.97	3.03	0.00	42.01
5	38.60	4.64	0.00	43.24
6	8.96	1.18	0.29	10.43
7	1.97	0.00	0.96	2.93
8	1.26	0.00	0.13	1.39
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	89.77	8.85	1.38	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,450 ppm C total)

TABLE 21. WASHINGTON, D.C., AMOCO UNLEADED PREMIUM

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.06	0.00	0.00	0.06
4	4.99	1.44	0.00	6.43
5	10.58	5.85	0.00	16.43
6	7.05	3.92	1.02	11.99
7	4.61	1.64	15.12	21.37
8	10.99	0.04	11.33	22.36
9	3.62	0.03	10.16	13.81
10	1.15	0.00	5.68	6.83
11	0.22	0.00	0.30	0.52
12	0.14	0.00	0.06	0.20
TOTAL	43.41	12.92	43.67	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	VOLUME PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	42.39	6.84	0.00	49.23
5	33.33	5.70	0.00	39.03
6	5.35	3.19	0.28	8.82
7	0.69	0.00	1.47	2.16
8	0.70	0.00	0.07	0.77
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	82.46	15.73	1.82	100.01

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.04	0.00	0.00	0.04
4	3.80	1.15	0.00	4.95
5	8.73	5.09	0.00	13.82
6	6.29	3.64	1.19	11.12
7	4.31	1.53	17.28	23.11
8	10.29	0.04	12.96	23.29
9	3.43	0.03	11.64	15.09
10	1.13	0.00	6.70	7.82
11	0.21	0.00	0.33	0.54
12	0.14	0.00	0.07	0.21
TOTAL	38.38	11.47	50.16	100.00

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	TOTAL
	WEIGHT PERCENT			
1	0.00	0.00	0.00	0.00
2	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00
4	36.80	5.73	0.00	42.53
5	35.91	5.97	0.00	41.89
6	6.89	4.01	0.33	11.22
7	1.03	0.00	2.02	3.06
8	1.19	0.00	0.11	1.31
9	0.00	0.00	0.00	0.00
10	0.00	0.00	0.00	0.00
11	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00
TOTAL	81.82	15.71	2.46	100.00

BULK LIQUID

SATURATED VAPOR @ 80 DEGREES F.
(1,200 ppm C total)

TABLE 22. WEIGHTING FACTORS (MOLECULAR WEIGHTS) USED IN CALCULATIONS

CARBON NO.	PARAFFINS	OLEFINS	AROMATICS	OXYGENATES	ACETYLENES
			MOLECULAR WEIGHTS		
1	16	0	0	32	0
2	30	28	0	44	26
3	44	42	0	60	40
4	58	56	0	74	54
5	72	70	0	80	68
6	86	84	78	102	82
7	100	98	92	116	96
8	114	112	106	130	110
9	128	126	120	144	124
10	142	140	134	158	138
11	156	154	148	172	152
12	170	168	162	186	166